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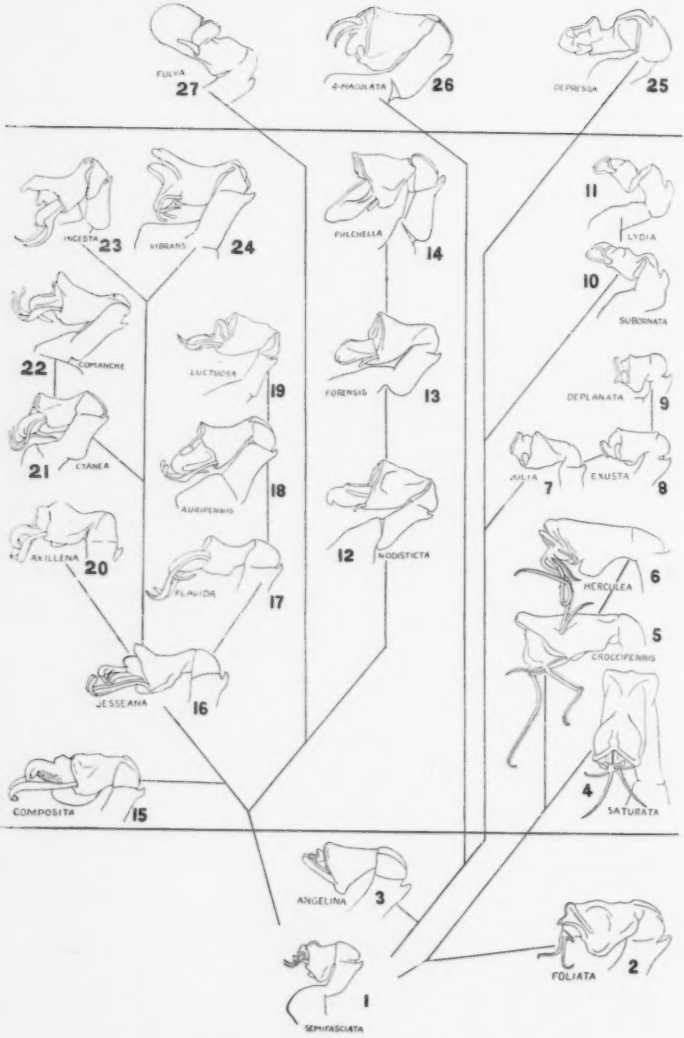

PHYLOGENY OF SPECIES OF LIBELLULA BY PENES—KENNEDY.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA

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CONTENTS

Kennedy—The Phylogeny and the Geographical Distribution of the Genus Libellula (Odonata)..... 65
Parshley—A change of name in the Saldidae (Hemip.)..... 71
Reinhard—Host Records of Some Texas Tachinidae (Diptera)..... 72
Photographs received for the album of the American Entomological Soc.. 73
Skinner—The Identity of Neominois ridingsi and N. dionysus (Lepid., Satyridae)..... 74
Ewing—Notes on the Occurrence and Distribution of Antarctic Land Arthropods (Springtails and Mites: Collembola and Acarina)..... 76
McAtee—Prosimulium fulvum Coquillett a Biting Species (Dip., Simuliidae)..... 79
Weiss and Lott—The Juniper Webworm, Ypsolophus marginellus Fabr. (Lepid., Gelechiidae)..... 80
Fall—A Correction and a Protest (Col.) 83
Chamberlin—A New Diplopod from British Guiana taken at Quarantine at Philadelphia..... 85
Riley—Food during Captivity of the Water-Striders, Gerris remigis Say and Gerris marginatus Say (Hem.) 86
McAtee—A Shower of Corixidae (Het.) 88
Editorial—Those Incomplete Titles Again..... 89
McAtee—Bird Lice (Mallophaga) Attaching Themselves to Bird Flies (Hippoboscidae)..... 90
Save the Zoological Record..... 91
Hutchison The Mulford Biological Exploration of the Amazon Basin. Bulletin No. 6..... 91
Entomological Literature..... 92
Review of Fletcher's Catalogue of Indian Insects..... 95
Review of The Bulletin of the Hill Museum..... 95
Doings of Societies—Entomological Workers in Ohio Institutions..... 96

The Phylogeny and the Geographical Distribution of the Genus Libellula (Odonata).[1]

By CLARENCE HAMILTON KENNEDY, Ohio State University, Columbus.

(Plate IV.)

In the first paper[2] was discussed the morphology of the penes in the genus *Libellula*. The various structures found in the penes were homologized and their usefulness in classification was pointed out. In this paper the writer wishes to show the value of these structures in a study of the phylogeny and distribution of the genus, for the penis characters divide the genus into distinct groups that are consistent with other characters and which appear to be consistent geographically.

Thanks to the generosity of Mr. Williamson, Dr. Calvert and Dr. Ris twenty-seven of the known species of *Libellula*

[1] Contribution from Department of Zoology and Entomology of Ohio State University, No. 68.

[2] Ent. News, vol. xxxiii, pp. 33-40, 1922.

have been examined. This article is an explanation of the accompanying plate.

If the reader will refer to the accompanying plate (IV), he will note that the genus falls into three levels of differentiation as indicated by the heavy horizontal lines. These are:

Level I. *Semifasciata, angelina* and *foliata.* By comparison with any of the other penes figured it is obvious that these are alike in that none of their parts are as much exaggerated or specialized as are one or more of the parts of any of the species figured in the two higher levels. By this same comparative standard, *semifasciata* is more generalized, hence older, than *foliata,* which has the cornua slightly specialized and than *angelina,* which has the lateral lobes lengthened and broadened. As will be shown later,[3] all three are probably pre-Miocene species.

Level II. This includes all the species lying *between* the two horizontal lines on Plate IV. These are all American and are species that probably date from the Miocene or later. Some of these groups are apparently at the height of their development.

Level III. This level includes the Eurasian species, less the primitive *angelina.* These are the most specialized of the genus and are the postglacial remnants of a Eurasian fauna that probably reached its climax in preglacial times.

The individual species and minor groups of the genus will be discussed as follows:

Group 1. **Semifasciata** Burm. Pl. IV, fig. 1. Maine to Florida, west to Michigan and Texas. A spring and early summer species found in woods swamps in the deciduous and southern pine forests.[4]

The primitiveness of this species seems to be confirmed by its isolated position morphologically, by its non-Libellula wing pattern, which has basal markings and color that recall *Celithemis* and *Perithemis,* by its less rugged build, which is very different from the husky proportions of many of the more specialized Libellulas, by its spring and early summer season which

[3] In the April number of the NEWS.

[4] As far as possible the writer has tried to correlate the distribution of the species of *Libellula* with the plant formations of the eastern United States as worked out by Transeau. See "Forest Centers of Eastern America," Amer. Nat., xxxix, pp. 875-889, 1905.

is the season of many other primitive Odonata, and, perhaps, by its retiring habit of life in woods-swamps where are not found many of the more specialized Odonata which enjoy the fierce strife of open ponds. Its general distribution through the wooded Appalachian region agrees with the distribution of other very primitive Odonata (*Tachopteryx, Cordulegaster,* etc.).

Group 2. **Foliata** Kirby. Pl. IV, fig. 2. Mexico to Panama, in zone 4 of Calvert (B. C. A. Neur., p. xxiv). March to July in small swampy places.[5]

A casual inspection of the plate shows at once that this is the most primitive member of the line of species terminating in *herculea.* However, it is so little differentiated as compared to the other three members of this series that it has been placed in Level I. *Foliata* is primitive in its smaller size, its antehumeral stripes, its lack of a distinct red coloration and in its distribution, for in zone 4 as outlined by Calvert[6] are found such primitive Odonata as *Xanthostigma, Cora, Paraphlebia, Cordulegaster,* etc. These are temperate species that apparently cannot stand the winter temperatures of the same faunal zone farther north. Hill[7] and Bray,[8] as mentioned by Calvert, suggest that the islands of zones 3 and 4 were connected and supported a continuous fauna in the Tertiary. At that time Mexico was a peninsula that had not been connected with South America since the Cretaceous and with its stable climate it has harbored these early Tertiary species to the present time.

Group 3. **Angelina** Selys. Pl. IV, fig. 3. Japan. Habits unknown.

Angelina is primitive in its full quota of three spots in the wings and in its penis whose only specializations are the lengthened lateral lobes and widened cornua. Its distribution confirms this diagnosis as Japan contains several very old Odonates. Being an island in a great ocean stream, its climate has probably been very stable and mild. The nearest modern relative of *angelina* is 4-*maculata.*

[5] From notes supplied by Dr. Calvert.
[6] Proc. Acad. Nat. Sci., Phila., Oct., 1908, pp. 475-478.
[7] Bull. Mus. Comp. Zool. xxxiv, pp. 205-207, 1899.
[8] Science, Nov. 9, pp. 709-716, 1900.

Group 4. **Saturata** Uhler. Pl. IV, fig. 4. Montana and Texas west to California and Baja California, occurring from sea-level up to 5000 ft.[9] This is a vigorous form of open muddy ponds, cattail swamps and sluggish streams.

Croceipennis Selys. Pl. IV, fig. 5. From sea-level in Texas and Baja California, to 4000 ft. elevation in Costa Rica, occurring in zones 3-4 of Calvert, but mainly in zone 4. Open swampy places and sluggish streams.[10]

Herculea Karsch. Pl. IV, fig. 6. Mexico to Ecuador and Paraguay. The "Biologia" records are from Calvert's zones 3 and 4. Usually found about brush piles in open muddy streams.[11]

Of this group, *saturata* appears to be the only species that can stand even light frosts. The other species occupy the Mexican and Central American highlands, though Dr. Calvert states in a letter that he found *herculea* at Guacimo, Costa Rica, at an elevation of less than 800 ft. The fact that this species has reached South America across the low Isthmus, shows that it can live also below the highlands. The climate of the Mexican and Central American plateau corresponds to that of the southeastern United States, except that the occasional winter frosts of the States are lacking. Because of the large number of species of *Libellula* occupying the southern states and this semitropical plateau, the climate of this region is probably the optimum climate for the genus.

This group has developed directly from the *foliata* stock of the Central American highlands (zone 4 of Calvert). Probably the present distribution of *foliata* is less than in former times as *saturata*, the most generalized species of group 4, has a distribution north of and not in touch with the present habitat of *foliata*. Dr. Calvert[12] describes individuals intermediate between *saturata* and *croceipennis*. It would be interesting to study the penes of these.

Group 5. **Julia** Uhler. Pl. IV, fig. 7. Maine to British Columbia. A species of northern coniferous forest swamps.

Exusta Say. Pl. IV, fig. 8. Maine to Wisconsin, south to Indiana and Ohio. A species of the deciduous forest.

[9] The higher records from Wyoming, etc., are probably from warm spring streams.

[10] In notes loaned by Dr. Calvert.

[11] Statements to the writer by E. B. and Jesse Williamson.

[12] B. C. A. Neur., p. 211.

Deplanata Ramb. Pl. IV, fig. 9. North Carolina, Georgia and Florida. Found by the writer about muddy ponds at Raleigh, N. C

The broad lateral lobes associate this with the *angelina*-4-*maculata* line. *Julia* appears to be the primitive species of this group in that specialization increases, from *julia* in the north to *deplanata* in the south, in the increasing length of the medial lobes and in the decrease in size, so that *deplanata* is the smallest species in the genus. This distribution and relationship to Eurasian species suggests an origin of this group in northern Eurasia and a migration to America later than the migration of the stocks of the *semifasciata, foliata, nodisticta* and *composita* groups which all show a preference for warmer climates than does *julia*. Geologists tell us that the opportunities for the migration of warm climate species existed largely before the Miocene, but that a migration of northern species came in the late Miocene and in the Pliocene. *Julia* and *exusta* at least are distinct species, probably also *deplanata*. Ris[13] states that "the habitus difference is greater between *julia* and *exusta* than between *exusta* and *deplanata*." This might be expected if *julia* is the most primitive of the three.

Group 6. **Subornata** Hagen. Pl. IV, fig. 10. Kansas and Texas to Nevada and southern California. Found about semidesert, alkali ponds.

Lydia Drury. Pl. IV, fig. 11. Newfoundland to British Columbia south to Florida and California. Any permanent pond.

These are a branch of the *angelina*-4-*maculata* line because of their widened lateral lobes. *Subornata* is the more primitive in the unfused wing-bands of the male, in the less broadened lateral lobes of the penis and in the less deeply divided fork on segment one of the male.[14]

In this series an adventitious wing-band has appeared. It is narrow and appears at the inner end of the stigma. In the female of *subornata* it is free; in the male of the same species it is fused with the nodal band by a paler area. In *lydia* it is more differentiated sexually. In the male it has become completely fused with the nodal band, thus giving the broad band

[13] Libellulinen, Coll. Selys, p. 259, 1919.

[14] Williamson. *Plathemis subornata.* Ent. News, Nov., 1906, p. 351.

of the male *lydia,* while in the female it appears only in rare examples.[15] *Subornata* should probably be associated with the group of southwestern primitives, *foliata, nodisticta* and *composita.*

Group 7. **Nodisticta** Hagen. Pl. IV, fig. 12. Montana and Washington[16] to the highlands of southern Mexico. A semidesert species taken by the writer on slow fresh streams at Oroville and Auburn, California.

Forensis Hagen. Pl. IV, fig. 13. Montana and British Columbia to Arizona and California. An alkali pond species, but may occur in fresh water also.

Pulchella Drury. Pl. IV, fig. 14. Maine to Washington south to Florida and California. A strictly fresh pond species.

The writer does not know the locality of the Washington record for *nodisticta,* but it must be near sea-level. The Montana record is probably from a warm, spring-fed stream, while all other United States records are from elevations of 500-3000 ft. Southward it is found at constantly increasing elevations until its southernmost authentic record is at 8000 ft. in Morelos, Mex. This would indicate that the Venezuelan and Colombian records in the earlier literature are questionable, for it is not probable that the Isthmus of Panama has been elevated enough to enable this species to pass into South America.

In this group specialization is towards a wing heavily spotted with black, alternating with areas of white pruinescence. It starts with the lightly marked wing of *nodisticta,* throws a species, *forensis,* more heavily marked, to the desert and reaches its apex in *pulchella* with three full bands in each wing. These species may not form a series as they have had to be arranged on the plate, but may be a group of mutations from some more primitive stock. The large size and the great development of wing color in *pulchella* indicate that it is the most specialized of the three. The distribution of *nodisticta* indicates that its naiad cannot endure heavy freezes, while the distribution of *pulchella* shows it to be almost as hardy as 4-*maculata* and *julia.*

[15] Kennedy. Odonata of Kansas, Bull. Kans. Univ., vol. 18, pl. VII, 1917.

[16] Muttkowski. Cat. Odonata N. Amer., p. 138, 1910.

(To be continued)

EXPLANATION OF PLATE IV.

A phylogenetic tree of the dragonflies of the genus *Libellula*, based on penes.

All figures are by camera lucida to the same scale. Because of the limits of the plate, species have had to be shown in series that should be on short lateral branches.

1. *Libellula semifasciata* Burm. Pungo Lake, Wenona, North Carolina.
2. *Libellula foliata* (Kirby), Cartago, Costa Rica, coll. Calvert.
3. *Libellula angelina* Selys. Kioto, Japan, coll. Ris.
4. *Libellula saturata* Uhler. Phoenix, Arizona.
5. *Libellula croceipennis* Selys. Cuernavaca, Mexico, coll. Williamson.
6. *Libellula herculea* Karsch. Santa Lucia, Guatemala, coll. Ohio State University.
7. *Libellula julia* Uhler. Kent, Ohio, coll. O. S. U.
8. *Libellula exusta* Say. Orono, Maine, coll. O. S. U.
9. *Libellula deplanata* Ramb. Raleigh, North Carolina.
10. *Libellula subornata* (Hagen). Golconda, Nevada.
11. *Libellula lydia* Drury. Sacramento, California.
12. *Libellula nodisticta* Hagen. Laws, Owens Valley, California.
13. *Libellula forensis* Hagen. Palo Alto, California.
14. *Libellula pulchella* Drury. (No label.) Coll. O. S. U.
15. *Libellula composita* (Hagen). Laws, Owens Valley, California.
16. *Libellula jesseana* Wllmsn. Enterprise, Florida, coll. Williamson.
17. *Libellula flavida* Ramb. Raleigh, North Carolina, coll. Williamson.
18. *Libellula auripennis* Burm. Kingsboro, North Carolina.
19. *Libellula luctuosa* Burm. Raleigh, North Carolina.
20. *Libellula axillena* Westw. Dunbrooke, Virgina, coll. Osburn.
21. *Libellula cyanea* Fabr. Kingsboro, North Carolina.
22. *Libellula comanche* Calv. Oroville, California.
23. *Libellula incesta* Hagen. (No locality.) Coll. O. S. U.
24. *Libellula vibrans* Fabr. Kingsboro, North Carolina.
25. *Libellula depressa* Linn. Lublin Government, Poland, from Bartenef.
26. *Libellula quadrimaculata* Linn. Grodno Government, Poland, from Bartenef.
27. *Libellula fulva* Müll. Arles (?), from H. K. Morton.

A Change of Name in the Saldidae (Hemiptera)

I have recently described a species of Saldidae as *Saldula comata* (Proc. Ent. Soc. British Columbia, No. 18, Syst. Ser., p. 21, 1921), but, as I am reminded by Dr. E. Bergroth, this name is preoccupied by *Salda comata* Champion (Biol. Centr.-Amer., Ins., Rhynch. II., p. 341, 1900). The two are undoubtedly congeneric and hence I would propose *Saldula comatula*, nom. nov., for my species.—H. M. PARSHLEY, Smith College, Northampton, Massachusetts.

Host Records of Some Texas Tachinidae (Diptera).

By H. J. REINHARD, Entomologist, Texas Experiment Station, College Station, Texas.

Twenty-one breeding records of sixteen species of Tachinidae are given in this paper. Twelve of these, so far as the writer is aware, have not been previously recorded. Where there is a published record the reference is given in each instance. Six records included in this list were obtained from F. C. Bishopp, M. M. High, and S. W. Bilsing, and due credit for each record is given below. All other breeding records given were made by the writer at College Station.

ARCHYTAS ANALIS Fabr. Host: *Cirphis unipuncta* Haw. Bred at College Station, from larva collected at Denton, Texas, by A. P. Swallow. 1 specimen issued June, 1919. Previously noted according to W. R. Walton.

EXORISTA CERATOMIAE Coq. Host: *Loxostege similalis* Guen. Bred from pupae collected at Laredo, and College Station. 4 specimens issued June 17, 1920.

EXORISTA CONFINIS Fall. Host: *Uranotes melinus* Hubn. Bred at College Station, from larvae collected at the following localities in Texas: Oletha, Mart, Trinity, Gause, Lott, Grand Saline, and Brazoria County. 14 specimens emerging from June 20, to July 10, 1920.

EXORISTA FLAVIROSTRIS v. d. W. Host: *Megalopyge opercularis* A. & S. Bred at Dallas, Texas, by F. C. Bishopp, from pupae of host. Many specimens issued during August and September, 1920. Also bred at College Station, from a caterpillar collected locally. 1 specimen emerged August, 1920. *Cf.* Coquillett, Revision of Tachinidae, p. 14.

EXORISTA LOBELIAE Coq. Host: *Alabama argillacea* Hubn. Bred by S. W. Bilsing at College Station. 1 specimen issued October, 1920.

EXORISTA PYSTE Walk. Host: *Loxostege similalis* Guen. Bred from pupae collected at College Station. 2 specimens issued June 16 and 17, 1920. Previously recorded by T. H. Parks at Wellington, Kansas, according to W. R. Walton.

ID. Host: *Acrobasis caryivorella* Rag. Bred by S. W. Bilsing at College Station, from pupae collected locally. Many specimens issued June, July, 1918, 1919, and 1920.

EXORISTA LOXOSTEGEAE Host: *Loxostege similalis* Guen. Bred at College Station from pupae collected locally. 23 specimens issued June 13-23, 1920. *Cf.* Ann. Ent. Soc. Amer., Vol. 14, No. 4, p. 332.

METAPLAGIA OCCIDENTALIS Coq. Host: *Herse convolvuli* L. Bred by M. M. High at Kingsville, Texas. Flies issued November, 1919.

ORMIA OCHRACEA Bigot. Host: *Gryllus assimilis* Fabr. Three maggots issued September 22, 1920, from an adult host specimen, collected by A. R. Cahn at College Station. The maggots pupated September 22,

but the adult flies failed to emerge. The puparia were identified by C. T. Greene. The habits of this genus are unknown and this appears to be the first record of a host relationship for this species.

PELETERIA ROBUSTA Wied. Host: *Cirphis unipuncta* Haw. Bred at College Station, from a larva collected in Wilbarger County, Texas. 1 specimen issued May 23, 1919.

PHOROCERA CLARIPENNIS Macq. Host: *Megalopyge opercularis* A. & S. Bred at Dallas, Texas, by F. C. Bishopp. 41 specimens issued during August and September, 1920.

ID. Host: *Laphygma frugiperda* A. & S. Bred at College Station, from larva collected in Hamilton County, Texas. 1 specimen issued June 4, 1919. This record previously noted according to W. R. Walton.

ID. Host: *Synchloe lacinia* Drury. Bred from chrysalides collected locally. 8 specimens issued August 1920.

PLAGIPROSPHERYSA PARVIPALPIS v. d. W. Host: *Loxostege similalis* Guen. Bred at College Station, from pupae collected at Laredo, Texas. 3 specimens issued June 14 and 15, 1920.

STURMIA ALBIFRONS Walk. Host: *Estigmene acraea* Drury. Bred at College Station, from larvae collected at Hempstead, and Bay City, Texas. 7 specimens issued June, 1918, and May, 1919. *Cf.* Coquillett, Revision of Tachinidae, p. 20.

STURMIA DISTINCTA Wied. Host: *Herse convolvuli* L. Bred at Kingsville, Texas, by M. M. High. Flies issued November, 1919.

TACHINA MELLA Walk. Host: *Apantesis rectilinea* French. Bred at College Station. 1 specimen issued June 7, 1918.

ID. Host: *Estigmene acraea* Drury. Bred from larvae collected at College Station. 2 specimens issued July 15 and 16, 1919. *Cf.* Coquillett, Revision of Tachinidae, p. 21.

TRICHIOPODA PENNIPES Fabr. Host: *Leptoglossus phyllopus* L. Bred at College Station, from adults collected locally. Flies issued June, 1919. *Cf.* Quarterly Bulletin, Fla. State Plant Board, Vol. 4, No. 3, p. 67.

ID. Host: *Nezara viridula* L. Bred from adults collected at College Station. Many specimens issued June, July, and August, 1919 and 1920. *Cf.* Loc. cit. and Bull. No. 689, U. S. D. A., p. 22.

Photographs Received for the Album of The American Entomological Society.

Since the last record (Ent. News, xxviii, p. 128), photographs for the album have been received, and acknowledged from the following, and the Society again wishes to thank the donors for their gifts which are much appreciated.

J. M. Aldrich, Charles P. Alexander, Karl W. T. Beling (from Dr. C. P. Alexander), Emil Bergroth, John J. Davis, William T. Davis, J. Henri Fabre (from Mr. Philip Laurent), G. F. Ferris, Morgan Hebard, Otto Heideman (from Mr. J. H. Paine), Herman Hornig, Herbert K. Morrison (from Mrs. Morrison), Emily L. Morton (from Mr. H. H. Newcomb), W. H. Patton (from Dr. L. O. Howard), Ottomar Reinecke (from Mr. Philip Laurent), Herbert H. Smith (from Dr. L. O. Howard).

The Identity of Neominois ridingsi and N. dionysus (Lepidoptera, Satyridae).

By HENRY SKINNER.

Ridingsi was described from four females taken at Burlington, Boulder County, Colorado. The types of *dionysus* were taken in the Juniper Mountains, on Mount Trumbull. This mountain is "sixty miles east of St. George" in southern Utah. *N. stretchi* Edw. is a synonym of *ridingsi* and the types were taken in Nevada. *Ashtaroth* Strecker is a synonym of *dionysus* and the type was a female from Arizona. The question is whether we have one or two species represented by these names.

Scudder in his description of *dionysus* says it differs from *N. ridingsi,* to which it is closely allied, by its larger size, its more cinereous tints, and by the much more produced serrations of the margins of all the banded markings of the hind wings. None of these characters appear to be differential and I have been unable to find characters that warrant the dividing these two forms into distinct species. There is a difference in size, but it only represents individual difference seen in many species. The males range from 20 mm. (one wing) to 25 mm., and the females from 24 mm. to 28 mm. The color varies considerably, but appears to be gradational and not differential. The serrations of the margins of the bands on the inferior wings are also gradational. The primary wings are identical in all the specimens I have examined. The series in the collection of the Academy of Natural Sciences of Philadelphia are from Whitehorn anad Glenwood Springs in Colorado; Beaver Canyon, Idaho; Medicine Bow, Wyoming, and Flagstaff, Arizona. The dates of capture vary from June 23rd to July 24th. Mr. W. H. Edwards gives an interesting account of *ridingsi* and says it flies from early June and also states that there is a late brood appearing in August and September. I have not seen any specimens with such late dates of appearance. Mr. Scudder says the types of *dionysus* were taken June 4th and June 7th to 10th.

David Bruce, who collected extensively in Colorado, states

that the two exist at the same altitude and cites *ridingsi* as common near Denver and *dionysus* as abundant at Glenwood Springs, Colorado. He records both forms from Salida, Colorado. He infers that they are two species and that *dionysus* is found on sandy and desert tracts and *ridingsi* is found in the short grass. We have a series of specimens from him, doubtless from Glenwood Springs, but having only "Colorado" on the pins. A series of specimens taken by Prof. A. J. Snyder in Beaver Canyon, Idaho, July 24, 1895, shows very

Genitalia of *Neominois ridingsi*, male.

considerable variation and both forms may be picked from this series. The specimen from Flagstaff, Arizona, is a typical *ridingsi*. The variations in the species do not appear to be due to geographical variation or altitude.

There are not sufficient data to judge of the brood differences, but the first brood would be likely to be somewhat different from a late one. An examination of the genitalia of the males shows no difference. The genitalic figure was made by Mr. E. T. Cresson, Jr. The original description spells the name *dionysus* (Greek name of Bacchus). The lists spell the name *dionysius* (the elder Tyrant of Syracuse). The original spelling should be followed.

Notes on the Occurrence and Distribution of Antarctic Land Arthropods (Springtails and Mites: Collembola and Acarina).

By H. E. EWING, Bureau of Entomology, U. S. Department of Agriculture.

Although vast in extent, the south polar region and more especially the Antarctic Continent itself, is remarkably devoid of any extensive land flora or fauna. Our knowledge of the occurrence of land arthropoda on this continent is in reality quite meager. Almost all of the land species so far discovered in this region belong to two orders, the Collembola and the Acarina.

Statements to the effect that winged insects do not occur in the Antarctic Region are not strictly correct, for Racovitza reported a dipteron taken by the Antarctic expedition of the "Belgica" (1897-1898), and Keilin has recently pointed out that Racovitza had not one but two species. One of these species, according to Keilin, belongs to the family Chironomidae and the other to the family Sciaridae. The reason for this apparent mistake by Racovitza was that he presumed that the larvae accompanying the adult, which he determined as *Belgica antarctica* Jacobs, were of the same species as the imago. Keilin has made a special study of *B. antarctica,* and states that it occurs along the strait of Gerlache between 64° and 65° 27′ south latitude. This is south and somewhat east of Cape Horn.

Several species of Collembola have been taken in the Antarctic, and one of these as far south on the continent itself as Granite Harbor, 77° S. lat. and 162° E. long., on the south-trending continental coast-line of Victoria Land. The significance of the distribution of the Collembola of the Antarctic Region has been very ably discussed by Carpenter, who notes, among other things, that the groups of springtails represented, that were at one time considered characteristically arctic or subarctic, are now known to occur in many places either on the American continents or adjacent islands. This would seem to indicate a former land connection between the Antarctic and South American continents. Carpenter states: "We cannot

doubt that this affinity points to a former connection between the Antarctic continent of which the South Orkneys once formed part, and the northern continents."

The other group of terrrestrial Arthropods represented in the meager south polar fauna, the Acarina, have been studied by Trouessart and by Berlese. It is interesting to note that these two authorities on mites hold almost opposite views in regard to the significance of the geographical distribution of the Antarctic Acarina. It is largely because of noting this fact, but also because of the present writer's knowledge of the American Acarina, that these lines are written. A further incentive is found, however, in the recent acquisition of a mite collection from the Antarctic Region through Captain George H. Wilkins, of the British Imperial Antarctic Expedition of 1920-21.

The material left by Captain Wilkins consisted of a vial of insects and mites. Three species are represented, one springtail and two mites. The specimens were collected on March 27, 1921, from Port Lockroy, Weinke Island, lat. 64.50 S., long. 63.30 W. This island is just off the coast of Graham's Land. The material has been studied and slides made for the United States National Museum. A report is here given. Species found:

(1). A springtail, *Cryptopygus crassus* Carpenter. Many specimens, representing all stages, present. Specimens sent to Dr. Folsom for confirmation of determination.*

(2). A beetle mite, *Halozetes* (*Lucoppia*) *antarctica* (Michael). Many specimens representing various nymphal stages and both sexes of adult stage.

(3). A gamasid mite, *Gamasellus* (*Gamasus*) *racovitzai* (Trouessart). A single male specimen found.

Captain Wilkins made the following note in regard to local conditions, habits, etc., of the species found: "Local conditions: Exposed cracked granite boulders at few feet above sea level on which penguins make their nests. Black-backed gulls nest in

*Dr. Folsom writes that the specimens sent also agree with specimens which Wahlgren referred to *C. antarcticus* Willem. Folsom also states that he believes the correct name for this species is *Cryptopygus antarcticus* Willem.

near locality. Bases of rocks are covered with penguin guano. Insects are found beneath loose boulders in crevices sometimes in separate colonies, sometimes together. Insects are active at all hours of day during summer except when rain is falling, at such time they seem to be unable to move if exposed to pressure of moisture. The round-bodied species (*Halozetes antarctica*) build dome-shaped brown cells closely connected but only one story high. Other species apparently do not build any kind of extra shelter."

There are known up to the present at least fourteen good species of terrestrial Acarina from the Antarctic Region. These species are well distributed in the order belonging, as they do, to four different suborders and five different families. Since some of these species are almost, if not quite, identical with species occurring in the Arctics and others are of a wide geographical distribution, Trouessart came to the conclusion that the Antarctic continent had no distinctive acarid fauna.

Berlese, who worked with a much larger amount of material and at a later date, came to the conclusion that two of the beetle mite species (one of them *Halozetes antarctica*) were sufficiently distinct to be placed in a new genus. He, therefore, established in 1916 the genus *Halozetes*, having as its type *H. antarctica* (Mich.). This genus, according to Berlese, includes species exclusively of the antarctic fauna and have little of affinity with the others which belong to the arctic, or subarctic. If Berlese's contention is correct this is the only case of a strictly endemic genus of Acarina thus far known in the Antarctic Region.

When the writer first observed the specimens of *Halozetes antarctica*, left by Captain Wilkins, he was especially struck with its resemblance to species with which he was familiar from our own country and from Europe. A more careful study of this species has been made, and the writer must insist that it is in reality fairly near some of the temperate or tropical species of the genus *Lucoppia* Berlese (type *Zetes lucorum* Koch). When the type species of *Halozetes* is compared with that of *Lucoppia* the differences between them appear to be sufficiently distinct, but when the type species of *Halozetes* is

compared with various other species of *Lucoppia*, one is at a loss as to where to draw the line of generic distinction. Certainly one would hardly conclude that *Halozetes* has *very little of affinity with other genera* known from arctic regions. Even the type of Berlese's genus *Lucoppia*, the old *Zetes lucorum* Koch, which occurs throughout all Europe and most of North America, is found in Spitzenbergen. The truth of the matter is that species rather closely related to *Halozetes antarctica* (Mich.) and *H. belgicae* (Mich.) are of practically worldwide distribution. The genus is practically cosmopolitan. The writer has described one species from decaying leaves and trash collected at Columbia, Missouri, another from decaying mushrooms at Jordan, Minnesota; another from moss, Nilgiri Hills, India, while our *Lucoppia pilosus* (Banks) is probably found throughout most of North America under a variety of conditions.

In closing these notes the writer wishes to state that according to his opinion, we are hardly justified in making any statement at present to the effect that the Antarctic Region supports a distinctive mite fauna that is of any significance whatever. Doubtless a more complete survey will bring more interesting and, very probably, quite remarkably distinct and characteristic mite species to our attention. At least we would expect so if we should draw any analogy from the bird fauna of this region, which is remarkably distinctive and characteristic in many respects.

Prosimulium fulvum Coquillett a Biting Species (Dip., Simuliidae). In his report on the Black Flies, Mr. J. R. Malloch says* with regard to this species: "There are no records of whether or not it bites either man or animals." This being the case it seems desirable to publish some notes given by Mr. A. H. Twitchell regarding the species, specimens of which were collected by him along Fourth-of-July Creek, Alaska, July 20, 1921. He states: "They are not very common but I could get a hundred of them at that place in an hour. They bite horses about the ears, inside or out and at times they bite around the eye and also go into the mane. I have seem them on no other stock than horses, but one bit me on the ear."

Prosimulium fulvum Coquillett ranges from Alaska south to British Columbia, Montana and Colorado. It is the largest species of the family in this country and the only yellow species known to occur in Alaska.—W. L. McAtee, U. S. Biological Survey, Washington, D. C.

* Tech. Ser. Bul. 26, U. S. Bur. Ent. 1914, p. 18.

The Juniper Webworm, Ypsolophus marginellus Fabr. (Lepid., Gelechiidae).

By Harry B. Weiss and Ralph B. Lott, New Brunswick, New Jersey.

This European species was first recorded as occurring in America by Dr. E. P. Felt in the 26th Report of the State Entomologist of New York[1] where it is mentioned as having been collected at Tarrytown and Plandome, N. Y., the larva feeding on juniper. Smith in his New Jersey list[2] mentions the species but gives no localities. Britton[3] states that it occurs in Connecticut, giving Hartford, Meriden, Greenwich and Wilton as localities. In all cases, juniper is the recorded food plant.

During the past several years, this species has been increasing in several places in New Jersey and doing noticeable damage. At present it is known definitely to occur at Rutherford, Scotch Plains, Springfield and New Brunswick, principally in nurseries. The larval feeding appears to be confined to the foliage of *Juniperus communis* and such varieties as *aurea, horizontalis, depressa, hibernica,* etc. Overwintering takes place in a partly grown larval condition, one-half to almost full-grown caterpillars hibernating in the webbed-up foliage. In the northern half of New Jersey, the caterpillars become active early in May, feeding on the more or less dry leaves and becoming full grown and pupating in numbers from the middle of May on. Pupation takes place in whitish, silken cases found among the partly eaten and webbed-up needles. The first moths issue about the last of May or first of June after a pupation period of about fifteen days. On account of the difference in size of the hibernating larvae, the moths appear over a period of several weeks, the majority however emerging about the middle of June. At this time they can be noted in the field, flying in irregular dashes from one juniper to another if disturbed.

Eggs are deposited singly and can be found in numbers during the third week of June. As a rule they are laid on the new

[1] Mus. Bull. 147, p. 35, 1910 (*Dichomeris*).
[2] Rept. N. J. State Mus. 1909 (*Dichomeris*).
[3] 15th Rept. State Ent. Conn. p. 137, 1915 (*Dichomeris*).

terminal growth, each egg being deposited in the axil formed by the stem and leaf. Many are found on the inner bases of the developing leaves near the shoot from which the leaves arise. Some are found on the surface of the shoots or stems. Usually they are deposited singly, rarely in pairs but an entire terminal shoot may bear several or more eggs. The incubation period is not definitely known but larvae 0.5 mm. in length were first found on July 8.

After hatching, the larvae feed on the upper epidermis of the small leaves, causing them to turn brown in spots and later entirely brown. About the last of July, when the larvae are about 2 mm. in length, the webs are plainly visible. As the larvae become older, their gregariousness becomes more pronounced and the foliage is webbed-up more compactly. At first the web includes the terminal shoot; later several inches behind the tip are included and such webbed-up shoots occur on different parts of the plant, spoiling its ornamental appearance. As the season progresses, the webs become larger, filled with more excrement and the leaves become dry and dead. Small junipers of the upright kind, such as *hibernica*, may be webbed-up solid from top to bottom. There appears to be only one brood each year, the caterpillars developing slowly during the summer and hibernating during the cold months. In the spring, when they become active, if no or little green food is available, they appear to develop as readily on the dried foliage. The webs vary in length from one inch to two or three inches and longer, depending on the manner of growth of the plant infested. Such nests contain from several to fifteen or more larvae.

Egg. Length 0.5 mm. Width 0.21 mm. Subcylindrical, with broadly rounded ends: ends almost flat; one end slightly narrower than the other; sides subparallel; whitish when first laid, later becoming pinkish or tinged with pink; chorion sculptured with numerous, longitudinal, irregularly parallel wavy ridges.

Larva. Length about 14 mm. Width of head 1 mm. Elongate, narrow, subcylindrical, slightly tapering at both extremities. Head and prothorax subequal in width, remaining thoracic and abdominal segments, except the 8th and 9th, slightly wider and subequal in length. Anterior dorsal half of mesothorax and metathorax with transverse plicae. Head and body segments each bearing several, short, white hairs, most of them

arising from dark tubercles. Crotchets of prolegs biordinal, those of anal prolegs in two groups. Head dark reddish brown. Antennae yellowish brown. Thoracic shield broad, a variable brown; body light brown, longitudinally marked as follows: median stripe reddish brown, submedian stripes whitish, sublateral dark brown, lateral ones light reddish brown, all somewhat interrupted; thoracic legs dark brown, prolegs yellowish white, apically light brown; anal plate reddish brown, posterior margin dark.

Pupa. Length about 5.5 mm. Slender, reddish brown; wing cases extending to fourth abdominal segment; terminal segment subacute, narrowly rounded with a cluster of 5 or 6 irregular, long, slender, hooked spines.

Adult. This was described by Fabricius in 1781 (Spec. Insect. 2:307) as *Alucita marginella*, the original description being as follows: "alis fusco nitidis, marginibus niueis. Habitat in Juniperetis Angliae. Mus. Dom. Yeats. Media. Palpi carassi, bifidi, interne niuei, externe fuscae. Caput niueum, antennis fuscis. Alae anticae fuscae, nitidae margine interiore et exteriore late niueo. Posticae exalbidae immaculatae."

The adult is rather attractive. The forewings are brown with white front and rear margins, the white disappearing before reaching the apex of the wing. The hind wings are uniformly pearl gray above and below, shining and heavily fringed. The thorax and abdomen above and below are light brown with a tuft of creamy white hairs on the head and prothorax. The wing spread is about 15 mm., and length about 7 mm.

According to Rebel[4] this species occurs in Europe except the polar regions and Siberia. Meyrick[5] mentions several English localities, Central Europe and Northern Asia. He also lists another species, *Ypsolophus juniperellus*, as occurring in a web on juniper.

For the control of this species, it is recommended that infested plants be sprayed or dusted with arsenate of lead during the last of June or first part of July when the webs are small, weak and easily penetrated. Later a dust could not be used and a spray would be necessary to penetrate the more closely webbed foliage. On some varieties of juniper, the dried nests containing caterpillars could be cut and burned early in the spring.

[4] Cat. Lepid. Palaearc. Faun. 2:159, 1901 (*Nothris*).

[5] Handb. Brit. Lepid., pp. 607-608, 1895 (*Ypsolophus*).

A Correction and a Protest (Col., Carabidae).

By H. C. FALL, Tyngsboro, Massachusetts.

In the December, 1919, number of the *Journal of the New York Entomological Society,* Mr. Howard Notman concludes, after a somewhat elaborate argument, that Hayward, in his Review of the North American Species of *Bembidium,* was in error in suppressing the *B. arcuatum* and probably also the *incrematum* of LeConte as synonyms of the European *dentellum* Thunb. Mr. Notman's points would seem to the casual reader to be well taken, but unfortunately his conclusions rest almost solely on his interpretation of the descriptions of the species in question, while Hayward, as we know, had the LeConte types before him at the time of writing, and being notably conservative in his work it is fair to presume that he would not have suppressed these names without good reason.

During a recent visit to the Museum at Cambridge I took the opportunity to examine carefully the types of *arcuatum* and *incrematum,* and to compare them with a good and undoubtedly authentic European series of *dentellum* present in the Museum collection, which comparison quite satisfied me that Hayward's course was the correct one.

This incident is here mentioned, not so much to correct Mr. Notman's misapprehension in this particular case, as to express a protest against the custom, all too common of late, of creating so-called new species on differences evolved from a too rigid interpretation of the descriptions of the earlier authors. To cite a single instance out of many: There occurs on the Southern California seashore a rare and aberrant little Carabid, described by LeConte, under the name *Lymnaeum laticeps,* afterward referred to *Bembidium.* In the brief description the color is given as piceous tinged with rufous, and the thorax is said to be not wider than the head. In a recent paper Col. Casey describes as new *Lymneops angusticeps* from the same region and having the same peculiar characters, but held to be distinct because of the color being pale red brown with a discal fuscous cloud, and the head not as wide as the thorax. As a matter of fact the head is not as wide as the thorax in the type of *laticeps* and the color is substantially as described of *angusticeps.* In other words, Casey's description of *angus-*

ticeps fits LeConte's type of *laticeps* better than does the original diagnosis. I have in my collection specimens from San Pedro, California, the type locality of *angusticeps,* which are unquestionably the same thing, and which show conclusively that *angusticeps* is an absolute synonym of the LeContean species.

Here the responsibility for the synonym rests, I think, not so much upon the rather trifling inexactness of the old Latin diagnosis, as upon the failure to allow for this in the face of the *prima facie* probability that the San Diego type and the nearby San Pedro specimens were specifically identical. As a perfectly true generalization we may say that every description, no matter how carefully drawn up, is in some degree inadequate, or as my friend Banks more strongly put it during a recent conversation at the Museum,—"descriptions never can be relied upon." That there is a very large kernel of truth in this somewhat epigrammatic statement must be evident when we reflect that no two taxonomists would describe the same insect in the same way or in precisely equivalent terms; nor on the other hand would a given description convey precisely the same meaning to two different individuals, or even to the same individual under different conditions, the interpretation as well as the description depending upon general experience, degree of familiarity with the group in question, and that very real but indefinite bias known as the personal equation, not to mention certain other incidental factors which may further color the views of the individual.

All this of course is perfectly well known, and yet its entire disregard in some quarters coupled with a tendency to magnify into specific characters the inevitable more or less trifling individual or local variations to which all organic species are subject, is burdening our literature with a mass of useless names which serve only to further obstruct and befog an already difficult pathway. Since of the making of species as "of the making of many books there is no end," we should at least see to it that our creations rest on reasonably secure foundations, lest we give further cause for the mental reservation which a glance at the new check list excites in most of us, best expressed perhaps by the misquotation—of a truth there are fewer things in heaven and earth than are dreamed of in our philosophy.

A New Diplopod from British Guiana taken at Quarantine at Philadelphia.

By RALPH V. CHAMBERLIN, Cambridge, Massachusetts.

A number of myriopods were found in soil around a potted palm from Georgetown, British Guiana, by Inspector Chester A. Davis who took the plant from a passenger on the American schooner "Rosalie Hall" at Philadelphia on May 23, 1921. Among these are two specimens of the chilopod *Mecistocephalus maxillaris* (Gervais) which, it may be noted, was first described at Paris in 1837 from a specimen apparently similarly immigrant. One symphylid occurs, this being the widespread *Scutigerella immaculata* (Newport). The diplopods represented comprise a female of the tropicopolitan *Orthomorpha coarctata* (Saussure), two very young spiroboloids probably belonging to *Rhinocricus,* and the interesting new nannolenid described below, this being represented by several males and females.

TRICHONANNOLENE, gen. nov.

Gnathochilarium as in *Epinannolene.* Ocelli present. Head and tergites clothed with numerous short hairs. Gonopods of male with telopodite presenting a slender branch ectal in position and fitting into a notch of the principal branch; the latter broad, not two-pronged as in *Epinannolene.* Posterior legs of seventh segment in male abortive. Genotype,—*T. guiananus,* sp. nov.

Trichonannolene guiananus, sp. nov.

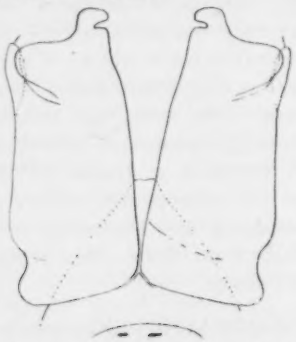
Dark brown, with head, antennae and legs paler.

Head proportionately broad; with no distinct median sulcus across vertex; clothed with numerous short, straight hairs. Antennae with second article narrower than the first, slender and widening distad, the other joints widening clavately distad to the fifth, the sixth cylindrical, the seventh short and narrower. Eyes widely separated; composed of comparatively few, small and often indistinct, ocelli which are normally in two series, or with one in a third; e. g., 2, 4; 3, 3; 3, 4; and 1, 3, 2.

Collum with caudal margin nearly straight, the anterior margin convex; lower ends inflexed beneath, rather narrowly rounded, the anterior margin flattened or slightly notched a little above the lower end; with four principal striae beneath on each side, these striae fine and curving upward anteriorly so as to parallel anterior margin for a short distance. With numerous regularly spaced setae similar to those of head.

Segments of body deeply constricted, with posterior division longer and somewhat thicker than the anterior. Pore well removed caudad from furrow. Tergites behind constricting furrow clothed conspicuously with numerous short straight hairs, similar ones also present on anal tergite and valves.

Last tergite widely rounded behind, equalled or a little exceeded by the valves. Valves weakly margined, flattened on each side. Anal scale with caudal margin nearly straight.



Trichonannolene guiananus gen. et sp. nov. Gonapods of male, posterior view.

The gonopods of male as shown in the accompanying figure. Behind the gonopods a pair of minute, conical appendages represent the posterior legs of the segment in abortive condition.

Number of segments in male, thirty-one to thirty-eight; in the female, to forty-four.

Length, to about 12 mm.

Type in the Museum of Comparative Zoology, Cambridge, Massachusetts.

Food during Captivity of the Water-Striders, Gerris remigis Say and Gerris marginatus Say (Hem.).[1]

By C. F. Curtis Riley, University of Manitoba, Winnipeg, Canada.

The writer has been giving attention to the general habitat responses of water-striders for the past ten years. In the course of these investigations, a considerable amount of data

[1] Certain phases of the food problem of aquatic Hemiptera have been discussed by me in another paper, in which reference is made to the food of water-striders: 1918. Riley, C. F. C. Food of Aquatic Hemiptera. Science, N. S., Vol. XLVIII, pp. 545-547.

has been accumulated in connection with their food habits. In this short paper it is the intention to direct attention to certain different kinds of food used by *Gerris remigis* Say and *Gerris marginatus* Say while in captivity in aquaria.

In my habitat studies of these two species, it has been noticed that *Gerris remigis* feeds on a variety of insect food, and the same is true with respect to *Gerris marginatus*. Additional information was obtained on this tendency toward omnivorous feeding, while studying water-striders during confinement in aquaria. Many observations were recorded with respect to the kind of food that was eaten.

It was found that both *Gerris remigis* and *Gerris marginatus* will feed on the pupae and adults of *Culex* sp., small and large species of Tipulid flies, Syrphid flies, *Musca domestica, Chironomus* sp., *Tabanus* sp., and *Drosophila ampelophila.*

Gerris remigis is a more vigorous and daring feeder than is *Gerris marginatus* and has been observed to feed on *Notonecta undulata, Chrysopa* sp., *Calopteryx maculata, Hetaerina americana,* and *Arctocorixa* sp.

My observations seemed to indicate that both species of water-striders are flesh feeders, but when they have been deprived of food for several weeks, they are, apparently, not particular as to the character of their food. Both *Gerris remigis* and *Gerris marginatus* were noticed as they were feeding on the soft parts of banana fruit and also on the inner softer portions of the skin. Several persons in the laboratory saw this unusual form of response. During confinement in aquaria, both species suck the juices of freshly killed snails, *Physa* sp. and *Planorbis* sp. and also small pieces of fresh beef.

Gerris remigis and *Gerris marginatus* display cannibalistic responses in their own habitat. When their brook habitat so shrinks in volume, during a drought, that there remain only a few small isolated pools in the bed of the stream, thus depriving the gerrids of food, they will attack members of their own species. This somewhat unusual response has been observed to occur in aquaria. *Gerris remigis* not infrequently seizes and sucks the body juices of weaker individuals of its own kind and also of *Gerris marginatus*. *Gerris marginatus* has been seen to feed on the weaker members of its own species.

These cannibalistic traits are more in evidence when the gerrids have been deprived of food for two or more weeks. This statement regarding the cannibalism of these two species of water-striders is somewhat at variance with the observations of McCook[2], who has not seen such food responses of gerrids.

While most of the observations on water-striders in captivity seem to indicate that they prefer fresh food, yet they have been seen to feed on recently dead insects and also on those that have been dead so long that they are beginning to decay. Both *Gerris remigis* and *Gerris marginatus* have been observed to use as food freshly killed and stale individuals of their own kind, also *Musca domestica* and *Drosophila ampelophila* in a similar condition.

These observations seem to indicate that both species of gerrids are indiscriminate feeders and apparently will use as food many kinds of animal bodies. Little choice appears to be shown, so long as it is possible to push their bill-like mouth-parts through the exoskeleton into the softer tissues.

A Shower of Corixidae (Heter.).

In 1917 the writer published a Review of instances of "Showers of Organic Matter"* and genuine cases of insect rain were found to be few. This year the writer received, through the kindness of Dr. A. K. Fisher, a mass of Corixidae with the following note by Mrs. A. P. Bigelow, of Ogden, Utah, the collector.

"I am mailing you a box containing samples of a swarm of insects which fell near here last night. A few were dead and the living were unable to raise themselves from the ground though provided with tiny gauze wings. They fell in a thick swarm covering a space not to exceed six feet and pattered like hail on the straw hat of the farmer as he sat by his door about 9 P. M. They lay thickly covering the ground. I saw them this morning (August 3, 1921) still unable to fly and lying in thick heaps."

Subsequent inquiry developed the fact that there was no light which might have attracted the insects. This question, among others, asked for safety's sake, was really unnecessary since such small insects rarely if ever, come to light in numbers so great as to form "thick heaps."

These water boatmen (of the genera *Ramphocorixa* and *Corixa*) had a generally frayed appearance, and although no unusual wind was noted when they fell it is probable that somewhere on their journey they had encountered some destructive wind phenomenon that resulted in their precipitation to the ground.—W. L. McAtee, U. S. Biological Survey, Washington, D. C.

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[2] 1907. McCook, H. C. Nature's Craftsmen. New York, p. 267.

* Monthly Weather Review, 45, pp. 217-224, May, 1917.

ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., MARCH, 1922.

Those Incomplete Titles Again.

Several times in recent years we have had occasion to call attention to the derelictions of authors and editors in the matter of incomplete titles of papers. An editorial under this caption appeared in the NEWS for June, 1915, page 280. In a set of "New Year's Resolutions for the Entomologist," in our issue for January, 1920, page 22, was one reading:

6. Add the names of the Order and the Family, to which the insects treated belong, to the title of your paper.

It seems hardly necessary to point out again the reasons for this addition.

We lately had to sort out some publications of the Federal Department of Agriculture for definite purposes and to group them by orders and families. Here are some of the snags we struck:

Wade & Boving. Biology of Embaphion muricatum. 1921.
Beyer. Garden Flea Hopper in Alfalfa and its Control. 1921.
Snyder. Injury to Casuarina trees in Southern Florida by the Mangrove Borer. 1919.
Brooks. Spotted Apple-tree Borer. 1920.
Hofer. The Aspen Borer and How to Control it. 1920.

The list could be extended easily. In all of these cases it was necessary to hunt through the text to learn the family and order. A professional economic entomologist would probably not have had our difficulty, but presumably the publications in question are not intended for his use alone, and even the term "Borer" is, we observe, not co-extensive with the name of any one order. The Federal Government should set us a better example and help us to conserve our time as well as our foods.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE

Bird Lice (Mallophaga) Attaching Themselves to Bird Flies (Dip., Hippoboscidae).

Finding two instances of this phenomenon led the writer to look up previous records. In this he has had the help of Dr. Joseph Becquaert. The latter and Mr. J. R. Malloch named the bird flies concerned in the present cases and Mr. E. A. Chapin the bird lice. In each of the two instances the fly was *Ornithomyia avicularia* L. as our slightly differentiated form is still known, and it happened also that the louse in each case was the same, namely, *Degeeriella rotundata* Osborn. One collection was made at the mouth of the Macfarlane River, Lake Athabaska, Saskatchewan, Aug. 11, 1920, by Francis Harper, from what bird is not stated, and the other from a western crow (*Corvus brachyrhynchos hesperis*) taken near Ontario, Oregon, Sept. 30, 1920, by E. R. Kalmbach. In both cases the mallophagan had attached itself to the hippoboscid by biting the mandibles into the upper surface of the abdomen near the hind margin.

References in the literature to cognate observations are:

[Banks, Nathan.] Entomological Notes from the Museum of Comparative Zoology, Psyche, Vol. 27, No. 1, Feb., 1920, p. 20.

Two specimens of Mallophaga on an *Ornithomyia*, one on each side near the tip of the abdomen.

Forsius, Runar. Ueber den Transport von Mallophagen durch Hippobosciden. Meddel af. Soc. pro Fauna et Flora Fennica, 38, pp. 58-60, Feb. 3, 1912.

A mallophagan, probably *Nirmus quadratulus* Nitzsch, fastened at base of wing of *Ornithomyia avicularia* L. p. 58.

Two mallophaga, one on the hind tibia, one on the abdominal hairs of an *Ornithomyia avicularia* L., one of them being identified as *Nirmus uncinosus* Nitzsch. p. 59.

Jacobson, Edw. Mallophaga transported by Hippoboscidae. Tijds. voor Ent. 54, 1911, pp. 168-9.

"mallophagan clasped between the legs" of an *Ornithoeca pusilla* Schiner.

Mjöberg, Eric. Studien über Mallophagen und Anopluren. Arkiv. f. Zoologi, VI, No. 13, 1910, p. 10.

7 *Docophorus leontodon* Nitzsch on one, 3 upon another specimen of *Ornithomyia*, firmly attached to long hairs of abdomen.

[Sharp, David.] [Mallophagan on Ornithomyia.] Proc. Ent. Soc. Lond., 1890, p. xxx.

Dr. Sharp exhibited a specimen of *O. aviculare* L., collected at Dartford, England, "to which were firmly adhering—apparently by their mandibles—several specimens of a mallophagous insect."

Wanach, B. Transport eines *Philopterus* durch *Ornithomyia avicularia* L. Ent. Rundschau, 27, No. 17, Sept. 1, 1910, p. 121. "fest an den Hinterleib."

The extent to which the Hippoboscid genus *Ornithomyia* figures in the above records is rather surprising, certainly more than would be expected considering the abundance of flies of this genus relative to others in the family.—W. L. McAtee, U. S. Biological Survey, Washington, D. C.

Save the Zoological Record!

[We reprint the following note entitled "The Zoological Record' from *Science* for Dec. 30, 1921.]

"*The Zoological Record*, which was founded in 1864 by English zoologists, has been issued regularly ever since and contains each year a complete bibliography of all publications connected with zoology. It is now the sole work of the kind, and is invaluable to all workers in every branch of zoology.

"Previous to 1914 *The Zoological Record* formed part of the 'International Catalogue of Scientific Literature,' and was issued under the joint responsibility of the Royal Society and the Zoological Society. As the Royal Society found itself unable to proceed with the volumes of the 'International Catalogue' after the issue for 1914, the Zoological Society has undertaken to prepare and issue the volumes for 1915-1920, inclusive, at its sole financial risk.

"It is the wish of the record committee of the Zoological Society to continue the publication of this most useful work, but it is obvious that they cannot expect the Society to undertake the heavy financial liability involved in publication unless they receive reasonable support from working zoologists both at home and abroad.

"I hope, therefore, that all working zoologists who agree with me that the suspension of the publication of the *Record* would have a most disastrous effect on the progress of zoology, will either subscribe themselves or will urge the librarians of the institutions with which they are connected to do so.

"A prospectus and form of subscription either for the whole or separate divisions of the *Record* can be had on application to the Zoological Society. W. L. SCLATER, Editor.

"Zoological Society of London, London, N. W. 8."

The Mulford Biological Exploration of the Amazon Basin. News Bulletin No. 6.

It is with greatest regret that we have to confirm previous reports of the ill health of Dr. Rusby, the Director of the Mulford Exploration. Some of the earlier messages from the Exploration party indicated that Dr. Rusby was suffering from an infected tooth and from neuritis as early as last August. Although his suffering was continuous and unabating in severity, yet he could not be persuaded to give up nor to alter the plans which he had laid down for himself. He gamely continued to work strenuously at his botanical collection at every possible opportunity and he not only pursued vigorously his own department of the work, but set himself grimly to the task of directing, controlling and planning for the general work and progress of the expedition. With all this he found time to write many letters and to keep detailed records and accounts of many subjects outside of his own botanical work. By the middle of November, his condition had become so bad that he was compelled to give up, not because of the pain and suffering, which he seems to have borne with a remarkable stoicism, but because the crippling effect of his neuritis made it very difficult for him to get about and he decided that it would be better for him to come home rather than continue as a drag and hindrance on the work of the others. He expected to reach New York sometime before March 1.

This decision being taken, the duties of the Director of the Expedi-

tion were turned over to Dr. W. M. Mann, Assistant Curator in the Division of Insects of the U. S. National Museum, and a man of wide experience in tropical travel and collecting. Under his direction the party will continue its work in Bolivia and Western Brazil, making studies and collections in the valleys of the Rio Beni and some of its tributaries, including the Rio Negro and Rio Ivon. The trip into Colombia as originally planned, was modified, and the party will continue its work in Bolivia and Brazil until March or April. The botanical work of the expedition is being continued by Dr. O. E. White, a representative of the Brooklyn Botanical Gardens and Harvard University, assisted by Señor Cardenas, a young Bolivian botanist of promise, who was taken on as a member of the party at the request of the Bolivian Department of Agriculture.

In spite of the change of plans for the Colombian part of the journey and the early termination of Dr. Rusby's active work in the field, we feel confident that the results when ultimately gathered together will prove the expedition to have been well worth while and to have fully repaid expenditures made therefor. Before Dr. Rusby left the party they had collected over 3000 plant numbers and to this many more will be added. They have already shipped to this country many boxes containing specimens of economic importance. Other departments of the work of the expedition have been equally successful. Dr. Mann has collected over 100,000 insects, including 125 different species of ants. The collection of fish is also important and growing rapidly as they descend to the deeper and wider rivers.

R. H. HUTCHISON, *Secretary*, Philadelphia, Pa.

Entomological Literature

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded.

The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of papers containing new genera or species occurring north of Mexico are grouped at the end of their respective Orders.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

The titles occurring in the Entomological News are not listed.

7—Annals of The Entomological Society of America, Columbus, Ohio. **10**—Proceedings of the Entomological Society of Washington, D. C. **11**—Annals and Magazine of Natural History, London. **12**—Journal of Economic Entomology, Concord, N. H. **21**—The Entomologist's Record, London. **24**—Annales de la Societe Entomologique de France, Paris. **30**—Tijdschrift voor Entomologie, The Hague, Holland. **49**—Entomologische Mitteilungen, Berlin-Dahlem. **50**—Proceedings of the United States National Museum. **61**—Proceedings of the California Academy of Sciences, San Francisco. **68**—Science, Utica, Garrison & New York. **81**—The Journal of Parasitology, Urbana, Illinois. **85**—The Journal of Experimental

Zoology, Philadelphia. **89**—Zoologische Jahrbucher, Jena. **100**—Biological Bulletin of the Marine Biological Laboratory, Woods Hole, Mass. **110**—Naturwissenschaftliche Wochenschrift, Jena. **114**—Entomologische Rundschau, Stuttgart. **133**—Zoologica. Scientific Contributions of the New York Zoological Society.

GENERAL. Andreae, H.—Sammelgerate. **49,** x, 199-200. **Fox, W. H.**—Obituary. **10,** xxiii, 213. **Hoffmann, W. H.**—Ein denkmal fur Carlos Finlay in Habana. **49,** x, 194-5. **Phillips & Poos**—A lamp for taxonomic work in entomology. **12,** xiv, 504-6. **Seaver, F. J.**—Some wood-boring insects. (Amer. Forestry, xxvii, 769-72.)

ANATOMY, PHYSIOLOGY, ETC. de Baillon, P. C.—Note sur le mecanisme de la stridulation chez Meconema varium (Phasgonuridae). **24,** xc, 69-80. **Bodine, J. H.**—The effect of light and decapitation on the rate of CO_2 output of certain Orthoptera. **85,** xxxv, 47-55. **Forbes, W. T. M.**—The small primaries of lepidopterous larvae. **7,** xiv, 344. **Gerhardt, U.**—Neue studien uber copulation und spermatophoren von Grylliden und Locustiden. (Acta Zool. Stockholm, 1921, 241-327.) **Harvey, E. N.**—The nature of animal light. (J. B. Lippincott Company, 1920, 182 pp.) **Minnich, D. E.**—The chemical sensitivity of the tarsi of the red admiral butterfly, Pyrameis atlanta. **85,** xxxv, 57-81. **Pratje, A.**—Zur chemie des Noctiluca-zellkermes. Zeit. f. Ges. Anat., lvii, 170-32.) **Riley, C. F. C.**—Responses of the large water-strider, Gerris remigis, to contact and light. **7,** xiv, 231-89. **Whiting, P. W.**—Studies on the parasitic wasp, Hadrobracon brevicornis. **100,** xli, 153-55.

ARACHNIDA, ETC. Chamberlin, R. V.—The centipeds of Central America. **50,** lx, Art. 7. **Welsh, F. R.**—Poisonous spiders. **68,** lv, 49. **Wickware, A. B.**—An unusual form of scabies in fowls. **81,** viii, 90-91.

NEUROPTERA. Folsom, J. W.—A new Entomobrya. **133,** iii, 237-8.

HEMIPTERA. Essig, E. O.—(See under Hymenoptera.) **McAtee, W. L.**—The periodical cicada, 1919; brief notes for the District of Columbia region. **10,** xxiii, 211-13. **Osborn, H.**—Two tachigalia membracids. **133,** iii, 233-4.

Hoke, G.—Observations on the structure of the Oraceratubae and some new Lepidosaphine scales. **7,** xiv, 337-43.

LEPIDOPTERA. d'Almeida, R. F.—Notes sur quelques lepidopteres d'Amerique du sud. **24,** xc, 57-65. **Cockayne, E. A.**—The white border of Euvanessa antiopa. **21,** xxxiii, 205-10. **Fassl, A. H.**—Zwei Papilio-novitaten aus Brasilien. **114,** xxxix, 1. **Fox, C. L.**—An account of a collecting trip in the high Sierra. (Lorquinia, Los Angeles, 1919, 7-10.) **Kruger, E.**—Papilio laodamas und verwandte in Kolumbien und das weibchen von laodamas laodamas. **114,** xxxix,

3-4. **Lathy, P. I.**—An account of the Castniinae in the collection of Madame Gaston Fournier. (South American.) **11,** ix, 68-86. **Seitz, A.**—Die systematische stellung der Zygaeniden. **114,** xxxix, 1-3.

DIPTERA. Duda, Dr.—Fiebrigella und Archiborborus, zwei neue sudamerikanische Borboriden gattungen. **30,** lxiv, 119-146. **Felt, E. P.**—A new Diadiplosis. **133,** iii, 225-6. **Greene, C. T.**—An illustrated synopsis of the puparia of 100 Muscoid flies. **50,** lx, Art. 10. **Huckett, H. C.**—On the morphology of the ovipositor of certain Anthomyian genera. **7,** xiv, 290-328. **Lundbeck, W.**—New species of Phoridae from Denmark, together with remarks on Aphiochaeta groenlandica. (Vidensk. Meddel., Dansk Naturh. Foren. Kobenhaven, lxxii, 129-43.) **Young, B. P.**—Attachment of the abdomen to the thorax of Diptera. (Cornell Agr. Exp. Sta., Mem. 44.)

Curran, C. H.—Revision of the Pipiza group of the family Syrphidae from north of Mexico. **61,** xi, 345-393. **McAtee, W. L.**—Notes on Nearctic Bibionid flies. **50,** lx, Art. 11. **Reinhard, H. J.**—Some new species of Texas Tachinidae. **7,** xiv, 329-336.

COLEOPTERA. Boving, A. G.—The larvae and pupae of the social beetles, Coccidotrophus socialis, and Eunausibius wheeleri, with remarks on the taxonomy of the family Cucujidae. **133,** iii, 197-224. **Champlain, A. B.**—A long-lived woodborer. **68,** lv, 49-50. **Hauser, G.**—Die Damaster-Coptolabrus-gruppe der gattung Carabus. **89,** Abt. f. Syst., xlv, 1-389. **Heller, K. M.**—Systematische und faunistische notizen uber kaefer. **49,** x, 195-8. **Schwarz & Barber**—Descriptions of new species of C. **133,** iii, 189-94. **Wheeler, W. M.**—A study of some social beetles in British Guiana and of their relations to the ant-plant Tachigalia. Notes on the habits of European and N. Am. Cucujidae. **133,** iii, 35-136: 173-83.

Fisher, W. S.—A new Cerambycid beetle from California. **10,** xxiii, 206-8. **Van Zwaluwenburg, R. H.**—Melanotus hyslopi n. sp. **10,** xxiii, 210-11.

HYMENOPTERA. Brues, C. T.—A new Blepyrus. **133,** iii, 229-30. **Claassen, P. W.**—Typha insects: their ecological relationships. (Cornell Agr. Exp. Sta., Mem. 47.) **Essig, E. O.**—The argentine ant builds earthen protections for mealy bugs. **12,** xiv, 506-8. **Friese, H.**—Ueber die kegelbienen (Coelioxys) Brasiliens. **89,** xliv, Abt. f. Syst., 420-86. **Heikertinger, F.**—Tauschende ahnlichkeit mit ameisen (Myrmekoidie). **110,** 1921, 709-13. **Wade & Myers**—Observations relative to recent recoveries of Pleurotropis epigonus. **10,** xxiii, 202-6. **Wheeler, W. M.**—The Tachigalia ants. **133,** iii, 137-72.

Cushman, R. A.—North American Ichneumon-flies of the genera Clistopyga and Schizopyga. **50,** lx, Art. 4.

CATALOGUE OF INDIAN INSECTS. Part I—ACRYDIDAE (TETTIGIDAE), by T. BAINBRIGGE FLETCHER. Calcutta. Superintendent of Government Printing, India. 1921. 40 pp. 11 Annas.

This section of the proposed catalogue brings up to date the list of species of the Indian Acrydiidae, offering several very important improvements over the last comprehensive catalogue of this division of the Orthoptera. The most important* of these lies in giving, on the page margins, the exact localities given in the list of references, referring these to each reference by small numerals. In this way the localities originally given by each author can be determined at a glance.

Another decided improvement is the omission of numbers, which in Kirby's Catalogue were given even more than usual importance, as they were used for genotypic citations.

In the present Catalogue the genotype is in every instance cited and, if described from a locality outside of India, that locality is given. We believe the system would have been improved, had a reference to the original genotypic designation been given.

The present section is well handled and the Catalogue should be of the highest value to students of Indian Entomology.

We are, as a rule, not in favor of general catalogues and believe that, unless thorough and complete in every detail, they can be of real disadvantage to the student, who, relying on such, is sure to miss the literature overlooked. In the present case, however, it is evident that a general catalogue of Indian insects is greatly needed and the present section promises well for a thorough and satisfactory series.—M. HEBARD.

THE BULLETIN OF THE HILL MUSEUM, Vol. 1, No. 1. A magazine of Lepidopterology. Edited by J. J. Joicey and G. Talbot, with the assistance of L. B. Prout, A. E. Prout and W. Hawker-Smith. Issued October 17th, 1921, at the Hill Museum, Witley, Surrey, England. With 24 photographic plates of Lepidoptera and 8 photographs of other subjects. London. John Bale, Sons and Danielson. Oxford House, 83-91 Great Tichfield St., Oxford St., W. Price 30s. There are 200 pages including the index.

"This magazine has been established by Mr. J. J. Joicey for the purpose of giving to the entomological world the results of studies carried out at the Hill Museum, Witley." An interesting account is given of the museum and the personnel of the scientific staff, and the large and valuable collections it contains. A bibliography of the previous publications of the museum is given. The first paper in the new journal is by George Talbot and is entitled, "Euploeines Forming Mimetic Groups in the Islands of Key, Aru, Tenimber, Australia and Fiji." The other papers are as follows: "New Lepidoptera Collected by Mr.

* Kirby, Synonymic Catalogue of Orthoptera, III, pp. 1 to 62.

T. A. Barns, in East Central Africa," by G. Talbot. "Descriptions of New Forms of Lepidoptera from the Island of Hainan," by J. J. Joicey and G. Talbot. Judging from the first number this magazine promises to be of great value and interest to the Lepidopterist and we will look forward to seeing much scientific work come from the Hill Museum.—H. S.

Doings of Societies.

Entomological Workers in Ohio Institutions.

At the annual state meeting held in the Botany and Zoology Building, Ohio State University, Columbus, Friday, February 3, 1922, the following papers were read:

GENERAL. A. E. Miller.—Problem of a Collector. R. C. Osburn—The Tabulation of Specific Characters of Insects. Miss Mary Auten—Insects Associated with Spider Nests. T. G. Phillips—The Chemistry of some Common Insecticides. J. T. Potgieter and T. J. Naude—Economic Entomology in South Africa. E. C. Cotton—Notes of the Year on Inspection Work. J. W. Bulger—Control of some Greenhouse Insects.

EPHEMERIDA. F. H. Krecker—Emergence of a May-fly from its Nymphal Skin under Pelagic Conditions.

ODONATA. C. H. Kennedy—The Origin of Put-in-Bay Dragon Fly Fauna.

COLEOPTERA. W. C. Kraatz—A New Feeding Habit of a Dermestid Larva. W. V. Balduf—Parasites of the Cucumber Beetle. J. S. Houser—The Apple Flea Weevil. C. R. Neiswander and R. F. Chrisman—Hibernation Responses of the Asparagus Beetle.

HEMIPTERA. C. H. Waid—Observations on the Potato Leafhopper. T. H. Parks—Experiments and Demonstrations in the Control of Potato Leafhoppers and Hopperburn. Herbert Spencer—Aphid Parasites and Hyperparasites. C. R. Cutright—Relative Efficiency of Some Aphid Predators. D. M. DeLong—The Genus *Deltocephalus*. Some Notes on the Ecology and Distribution of the North American Species. H. L. Dozier—Male Genitalia of Delphacids. H. E. Evans—Observations on San Jose Scale in Southwestern Ohio.

LEPIDOPTERA. E. W. Mendenhall—Observations on the European Corn Borer.

DIPTERA. H. A. Gossard—Hessian Fly Emergence at Sandusky, Ohio, in 1921. M. B. Jimison—Three Years of Hessian Fly Control Work in Erie County, Ohio. J. S. Hine—Syrphidae Common to Europe and America.

The following officers were elected for 1922: *President*, T. H. Parks; *Vice President*, J. S. Hine; *Secretary*, W. V. Balduf.

T. H. PARKS, *Secretary*.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

Tropical Butterflies will be given in exchange for Terias nicippe, Vanessa antiopa, Euchloe sara or any aberrant forms of Lepidoptera. Hal Newcomb, 804 Elizabeth St., Pasadena, Calif.

I will collect material in any order, region Isthmus of Tehuantepec and C. A. Correspondence from persons needing material invited. J. J. White, Ocotlan de Morelos, Oaxaca, Mexico.

Wanted.—Diabrotica longicornis Say. from all parts of its range; also any N. A. species of this genus new to my collection. Liberal exchange. K. F. Chamberlain, Cornwall Bridge, Connecticut.

Wanted.—Elateridae from the Southern and Western States; Adelocera, Melanotus, and Cardiophorus especially desired. Liberal exchange in other Coleoptera, or for cash. Edward D. Quirsfeld, Hillsdale, New Jersey.

Halticini wanted in exchange for Coleoptera or insects of other orders.—L. G. Gentner, 213 Bailey St., East Lansing, Mich.

For Exchange—A large number of the living pupae of European Sphingidae for the living pupae of American butterflies and moths. I. C. Cheesman, Curator of Insects, Zoological Society of London, Regents Park, London, N. W., England.

Wanted—Species of Homoptera, Hemiptera and Orthoptera not represented in my collection in exchange for duplicate material of these orders from South Dakota. List of duplicates on application. H. C. Severin, South Dakota State College, Brookings, South Dakota.

Buprestidae, Cleridae, and **Carabinae** wanted from U. S. or Buprestidae of the world. Will collect insects of any group (except Lepidoptera) in exchange or pay cash. Alan S. Nicolay, 416a Grand Ave., Brooklyn, New York.

For Exchange—A large number of live cocoons of Callosamia promethea, C. cynthia and P. cecropia for other pupae or Lepidoptera. D. C. Heim, Sunbury, Pa.

Wanted to Exchange—N. A. Coleoptera for same not in my collection. Carl Selinger, 4419 Dover St., Chicago, Ill.

Wanted for Cash or Exchange—Catocala eggs, also brilliant colored butterflies and moths for trays. Mrs. Robert Milde, Lewiston, Minn.

Syrphidae from all parts of North America wanted. Monographing the family.—C. H. Curran, Department of Entomology, University of Kansas, Lawrence, Kansas.

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Mr. Sherman announces the recent purchase of a large portion of the library of Dr. A. Fenyes, of Pasadena, California, relating chiefly to Coleoptera; also of extensive lots of literature on Lepidoptera and other orders. A detailed catalogue of these items cannot be prepared until Fall, but students interested in certain papers are invited to submit lists of their desiderata.

JOHN D. SHERMAN, Jr.

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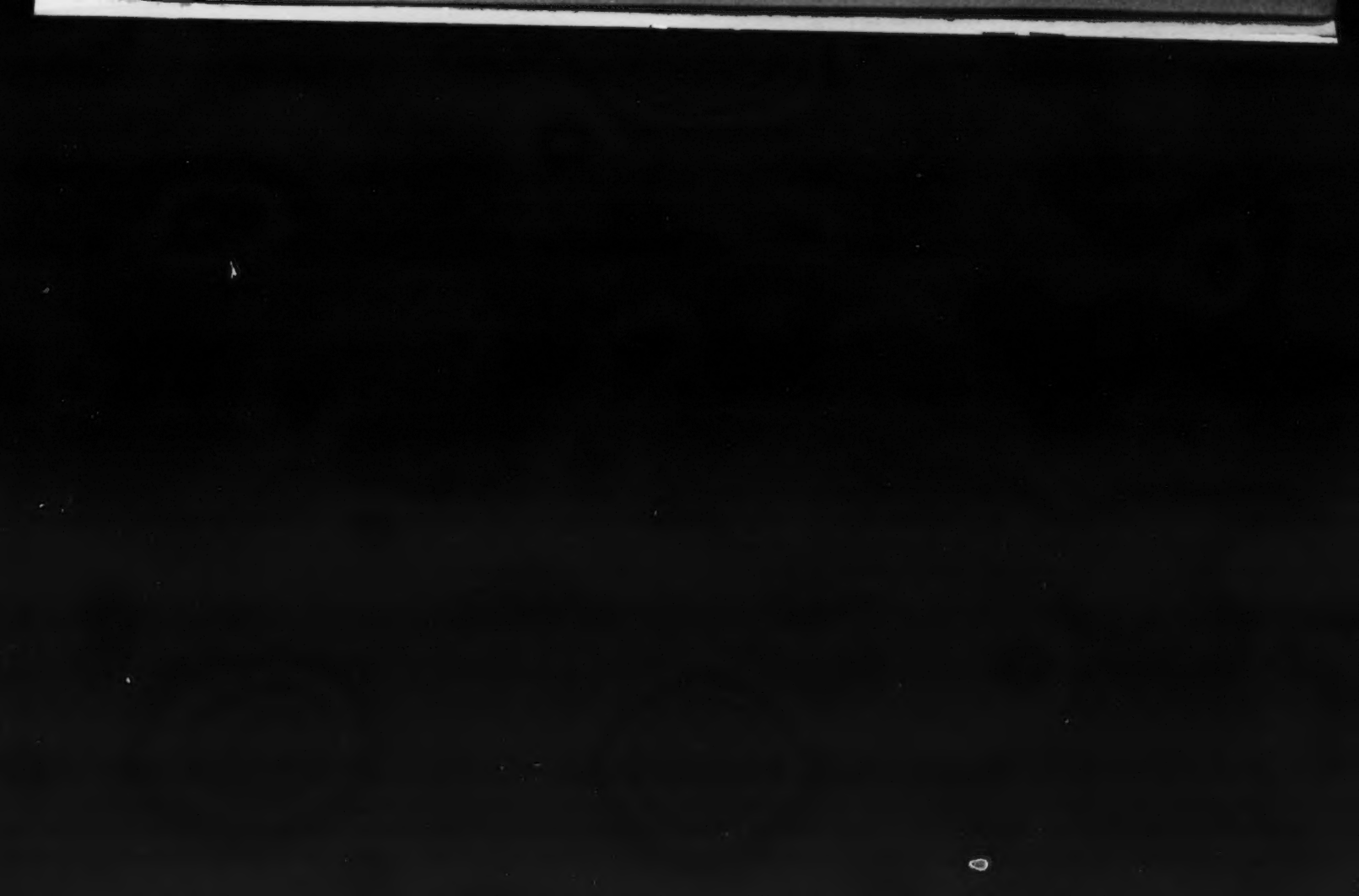

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